

AMENDMENTS TO THE SPECIFICATION

Please replaced the first full paragraph on page 4 containing lines 3-26, with the following replacement paragraph:

Between the chip 10 and the substrate 20, an under-filling portion 50 is formed to prevent cracking of the conductive bumps 16 due to the thermal expansion mismatch between the chip 10 and the substrate 20. Then, in order to promote the heat dissipation from the chip 10, a plate-shaped heat slug 40 is attached on the backside of the chip 10, on which an adhesion layer 14 is formed, using a solder film 30. The heat slug 40 is formed of a metal such as Cu, Al or CuW. In addition, grooves 43 are formed on the heat slug 40 to facilitate the heat dissipation by increasing the surface area of the heat slug 40. In addition, an adhesion layer (~~not shown~~) 32, which is typically a Ni/Al, Ag, or Pd layer, can be formed on one side 41 of heat slug 40 contacting the solder film 30 to secure the bonding between the heat slug 40 and the conductive solder film 30, and an anodizing layer (not shown) is formed on the other side of the heat slug 40 to prevent oxidation of the heat slug 40. The solder film 30 is formed of a metal alloy which includes Pb, Sn, Ag, In and/or Bi. Such metal alloy typically has thermal conductivity of 25W/mK to 40W/mK and good adhesion strength. The solder film 30 preferably has a size equal to or greater than that of the semiconductor chip 10, so that the solder film 30 covers the whole backside of the chip 20. The layer 14, which promotes the adhesion between the semiconductor chip 10 and the solder film 30, typically has a multi-layer metal structure. Exemplary structures of the layer 14 include VN/Au, Ti/VNi/Au, Cr/VNi/Au, Ti/Pt/Au, Cr/CrCu/(Cu)/Au, Cr/CrCu/(Cu)/Pd, and TiW/(Cu, NiV)/Pd.